DiMES and PFC relevant experiments from DIII-D

- General Tokamak Issues and DiMES activities
- Planning for 2005

C. Wong (GA), D. Rudakov (UCSD)
R. Bastasz, W. Wampler, J. Whaley (SNL)
J. Brooks (ANL), P. West, T. Evans, R. Deranian (GA)

R. Doerner (UCSD), J. Watkins (SNL), N. H. Brooks (GA)
S. Allen, C. Lasnier (LLNL), D. Whyte (UW)
P. Stangeby, A. McLean (U of Toronto)
W. Jacob (IPP, Germany)

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General PFC and ITER PFC issues and R&D items related to DiMES in DIII-D

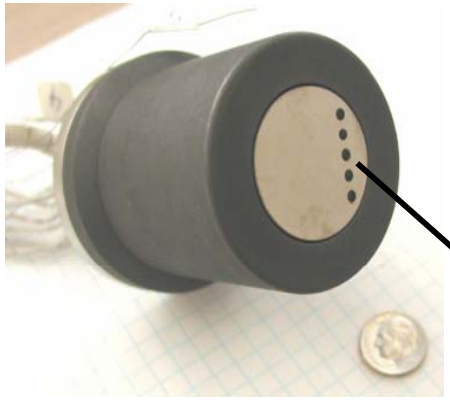
(Active items in 04)

1. Surface material transport including C and tritium
   - C-13 experiments in DIII-D
   - Temperature control DiMES gap experiments
   - Dust collection and characterization by INEEL
   - QMB in DIII-D
2. Deposited tritium removal
   - Heated chamber oxidation experiment in DIII-D supported by DiMES
   - Heated DiMES: measurement of deuterium up-take
3. Disruptions
   - Disruption mitigation, corresponding erosion difference measured by DiMES with and without mitigation.

4. Type-I ELMs
   - ELM suppression with stochastic magnetic boundary, surface erosion measurement using DiMES
   - QH mode ELM free operation
   - DiMES measurement of erosion from DIII-D disruption to simulate ITER ELM effects
5. Divertor heat flux, material erosion and re-deposition
   - Detached plasma using D, Ne or Ar gas...DiMES experiments to measure net erosion
   - DiMES solid surface material exposure, e.g. L-mode discharges
6. Uncertainty in edge behavior, including chamber wall erosion for long pulse and steady state devices
   - Proposed systematic study of surface material evolution using the multiple materials DiMES sample
   - Continuing coordination with the larger atomic physics community and benchmarking with DiMES experiments
   - Chamber wall erosion simulation by using upper single-null exposure and by using multiple materials DiMES sample
   - Fast probe measurements
   - DiMES porous plug experiment
   - Proposed outboard DiMES and fast probe mechanism

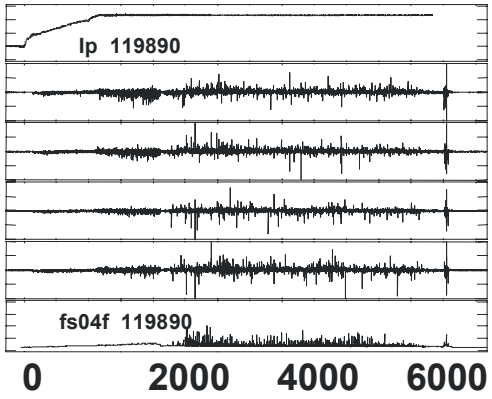
7. Divertor and chamber wall materials selection
   - DiMES W-rod experiment (sample returned to SNL)
   - DiMES multiple materials exposure including Be
   - Li-DiMES experiment
8. Diagnostics development
   - Hydrogen sensor
   - Advanced langmuir probe development in DiMES
   - Magnetic field sensor testing in DiMES
   - Metallic mirror testing in DiMES
   - Proposed smart tiles development in DIII-D
   - Bench mark of IR camera measurement
10 Predictive modeling
   - Modeling benchmark by DiMES experiments
11. SOL physics uncertainties
   - Benchmarked by DiMES experiments and modeling

Li-DiMES and additional hard wares



Li-DiMES
w/o Li-slots showing current monitors

Successful In situ Temperature control



Time, ms

Tile currents

DiMES rack with power supply

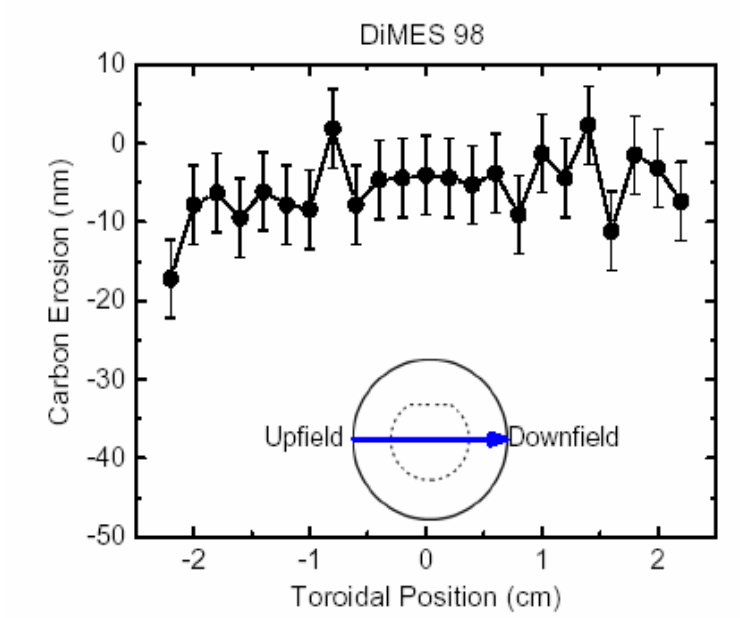
DiMES internal cables terminal

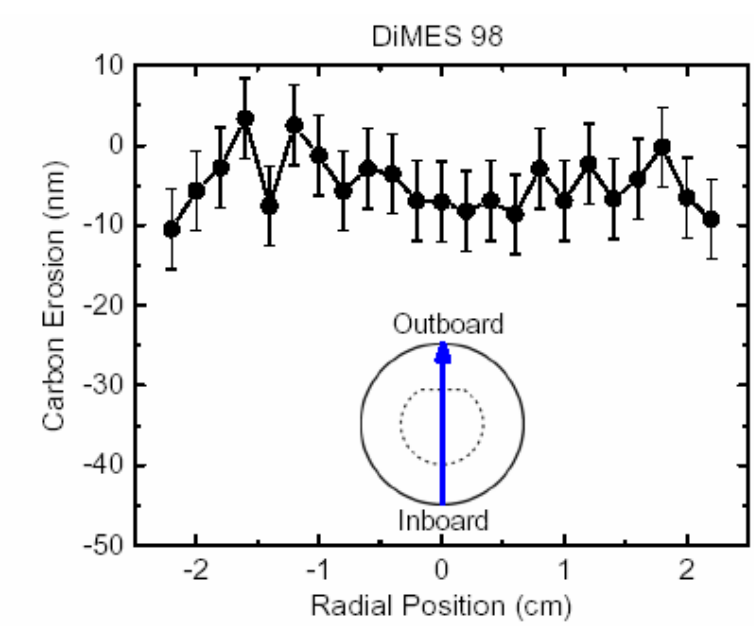
Recent Results from DiMES 98

Exposed to 6 L-mode discharges with sweeping OSP

Sandia National Laboratories

The net erosion was less than +- 10 nm ,
i.e.. less than the uncertainty of the measurement (+- 10 nm).

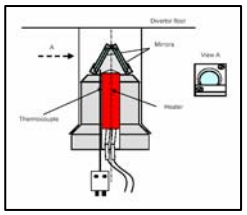




Physics parameters will be analyzed for modeling input

DiMES and DIII-D ALPS 2005 Activities

- **Dedicated experiments proposed: (up to end of March 2005)**
  - **Complete the support of the porous plug experiment**
  - **Metallic mirror experiment**
  - **Multiple materials erosion "simulate chamber"**
  - **Detached plasma using Ar gas**
- **Piggyback and supporting other experiments:**
  - **Hydrogen sensor**
  - **Dust collection by P. Sharp of INEEL**
  - **C dust migration**
  - **Tile current measurement prepared for Li-DiMES**
  - **Melted layer under disruption, simulated by Al coating**
  - **QMB sensor**
  - **Magnetic field sensor**
  - **Disruption and ELM experiments**
- **Atomic data and modeling**
  - **Modeling could focus on SOL and the gap experiments**
- **Hardware modifications:**
  - **Raise DiMES to new lower divertor floor level plus DiMES system improvements**
  - **Mid-plane DiMES and fast probe (proposed)**
- **Others**
  - **IR camera benchmark**
  - **Advanced diagnostics**



Mirror DiMES